

A new species of *Clibanarius* (Crustacea, Anomura, Diogenidae) from the eastern tropical Pacific

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KEY WORDS

Anomura,
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eastern Pacific.

ABSTRACT

A new species of hermit crab, *Clibanarius janethaigae*, is described for the eastern tropical Pacific. The species is typically subtidal, in depth of seven to ninety meters. It is readily recognized from the other three species of *Clibanarius* known from the region on the basis of the pereopods colour pattern, its much larger antennular peduncle, its heavily setose antennae, and the presence of rugae and spinules on the surface and margin of the shield.

RÉSUMÉ

Une nouvelle espèce de bernard-l'hermite, *Clibanarius janethaigae*, est décrite pour la région du Pacifique Est tropical. Cette nouvelle espèce se trouve associée avec la portion supérieure de la plate-forme continentale, entre sept et quatre-vingt-dix mètres de profondeur. Elle se distingue facilement des trois autres espèces de *Clibanarius* connues de la région par la coloration des péréiopodes, ses plus longs pédoncules antennulaires, ses antennes munies de longues et fortes soies, et par la présence de séries de tubercules et de petites épines sur l'écusson et sur les bords de celui-ci.

MOTS CLÉS

Anomura,
Diogenidae,
Clibanarius janethaigae n.sp.,
Pacifique oriental tropical.

Three species of the hermit crab *Clibanarius*, all intertidal, are currently recognized in the eastern tropical Pacific. The largest species, *C. panamensis* Stimpson, 1859, lives almost exclusively in coastal lagoons and estuaries and ranges from Magdalena Bay and Cholla Bay, Mexico, to Capon, Peru (Ball & Haig 1974). The other two species are much smaller and difficult to recognize on the basis of morphological features. Their colour pattern, however, allow to separate them. Indeed, in *C. albidigitus* Nobili, 1901, the outer and inner sides of the dactyls are white, while the distal part of the dactyls is reddish-orange in *C. digueti* Bouvier, 1898. In addition to this, *C. albidigitus* and *C. digueti* do not seem to share the same ecological niche at least in the southern Gulf of California. *Clibanarius albidigitus* is the second species of hermit crab in the eastern tropical Pacific to be predominantly associated with the turbid, very shallow water of the estuarine and coastal lagoons systems, where it lives at the edge of the water line, on muddy bottom; *C. digueti* is apparently restricted to much clearer water, on rocky bottom, in the lower intertidal (Ball & Haig 1974; Esparza-Haro 1993). *Clibanarius digueti* is known from Magdalena Bay and throughout the Gulf of California, south to Zihuatanejo, Mexico; *C. albidigitus* ranges from Puerto Peñasco, in the upper Gulf of California, to Paíta, Peru (Ball & Haig 1974; Brusca 1980; Hendrickx 1993).

A fourth species of *Clibanarius* has long been recognized for the area but was never described. It is typically associated with much deeper water and has been collected in several occasions during exploratory surveys in the Gulf of California.

The reference collection of invertebrates of the Marine Station at Mazatlan (Laboratorio de Invertebrados Bentónicos, LIB) contained a large series of unidentified *Clibanarius*. Recent review of this material, mostly collected aboard the R.V. *El Puma* from 1981 to 1992 allow us to conclude that these specimens belong to an undescribed species of this genus.

ABBREVIATIONS

CW carapace width;
SL shield length;
EMU Mazatlan Marine Station, where holotype and five lots of paratypes are deposited;

MNHN Muséum national d'Histoire naturelle, where two lots of paratypes are deposited;
USNM Smithsonian Institution, Washington D.C., where one lot of paratype is deposited.

Clibanarius janethaigae n.sp. (Figs 2, 3)

Clibanarius sp. Moran, 1984: 73, fig. 2a-c.

MATERIAL EXAMINED. — Off Altamura Island, Sinaloa, Mexico, 31.VIII.1979, trawling at 7 m: 1 ♀, CW 3.0 mm, SL 3.4 mm (EMU-936); 2 ♀♀, CW 2.25-3.5 mm, SL 2.5-4.0 mm, 1 ♀, CW 2.1 mm, SL 2.45 mm (EMU-935).

BBMAZ C17 Cruise. — Stn 3, 20.I.1981, Bay of Mazatlan, Sinaloa, Mexico, trawling at 14 m: 1 ♂ CW 3.6 mm, SL 4.25 mm (USNM-276071).

SIPCO I Cruise. — Stn A1, 23.IV.1981, 22°24'N - 105°54'W, off Teacapan, Sinaloa, Mexico, trawling at 35-36 m, 1 ♂ CW 3.27 mm, SL 3.64 mm, 1 ♀ CW 3.1 mm, SL 3.4 mm (EMU-4035). — Stn C1, 24.IV.1981, 23°37'N - 106°56'W, off Piaxtila Point, Sinaloa, Mexico, trawling at 40-41 m, 7 ♂♂ CW 1.77-3.7 mm, SL 2.08-3.85 mm, 5 ♀♀ CW 2.36-3.08 mm, SL 2.76-3.4 mm, 6 ♀♀ CW 2.1-3.1 mm, SL 2.54-3.4 mm (EMU-4036).

SIPCO II Cruise. — Stn B1, 24.VIII.1981, 23°11'N - 106°29'W, off Mazatlan, Sinaloa, Mexico, trawling at 32-34 m, 2 ♀♀ CW 3.2-3.45 mm, SL 3.7-4.05 mm, 1 ♀ CW 3.65 mm, SL 4.3 mm (EMU-4034).

SIPCO III Cruise. — Stn A2, 15.I.1982, 22°17'N - 106°11'W, off Teacapan, Sinaloa, Mexico, trawling at 66 m, 2 ♂♂ CW 2.15-2.35 mm, SL 2.5-2.65 mm (EMU-4099). — Stn C1, 16.I.1982, 23°37'N - 106°55'W, off Piaxtila Point, Sinaloa, Mexico, trawling at 45 m, 6 ♂♂ CW 1.77-2.27 mm, SL 1.82-2.55 mm (EMU-4100).

CORTES 1 Cruise. — Stn 3, 3.V.1982, 25°03'N - 108°31'W, off Santa Maria Bay, Sinaloa, Mexico, trawling at 28-29 m, 1 ♂ CW 2.78 mm, SL 3.21 mm, 3 ♀♀ CW 2.76-3.04 mm, SL 3.14-3.53 mm, 1 ♀ CW 3.78 mm, SL 4.15 mm (EMU-4101A to 4101E).

CORTES 2 Cruise. — Stn 61, 23.III.1985, 20°53'N - 105°27'W, off Mita Point, Nayarit, Mexico, trawling at 48-49 m, 1 ♂ CW 3.78 mm, SL 4.06 mm (EMU-4102).

CEEMEX C1 Cruise. — Stn 4, 21.VI.1990, 22°28'N - 105°45'W, off Teacapan, Sinaloa, Mexico, trawling at 9 m, 1 ♀ CW 3.45 mm, SL 3.86 mm (EMU-4103). — Stn 5, 21.VI.1990, 22°26'N - 105°45'W,

off Teacapan, Sinaloa, Mexico, trawling at 32 m, 2 ♂♂ CW 2.74-2.89 mm, SL 3.18-3.3 mm, 1 ♀ CW 2.23 mm, SL 2.55 mm (EMU-4104). — Stn 6, 21.VI.1990, off Las Cabras, Sinaloa, Mexico, trawling (depth unknown), 1 ♂ CW 1.9 mm, SL 2.01 mm, 1 ♀ CW 2.46 mm, SL 2.69 mm (EMU-4105). — Stn 9, 21.VI.1990, off Las Cabras, Sinaloa, Mexico, trawling (depth unknown), 5 ♂♂ CW 1.72-2.51 mm, SL 1.93-2.67 mm, 7 ♀♀ CW 1.57-2.84 mm, SL 1.66-3.08 mm, 1 ♀ CW 2.22 mm, SL 2.48 mm (EMU-4106). — Stn 14, 21.VI.1990, 23°20'N - 106°19'W, off Presidio River, Sinaloa, Mexico, trawling at 20 m, 1 ♂ CW 5.05 mm, SL 5.7 mm (EMU-4107). — Stn 27, 23.VI.1990, 24°29'N - 107°31'W, off San Lorenzo River, Sinaloa, Mexico, trawling at 40 m, 4 ♂♂ CW 2.87-3.17 mm, SL 3.37-3.63 mm, 1 ♀ CW 2.43 mm, SL 2.74 mm, 7 ♀♀ CW 2.6-3.25 mm, SL 2.85-3.69 mm (EMU-4108).

CEEMEX C2 Cruise. — Stn 24, 27.VIII.1990, off San Lorenzo River, Sinaloa, Mexico, trawling at 90 m, 1 ♂ CW 5.05 mm, SL 5.7 mm (EMU-4109).

CEEMEX P4 Cruise. — Stn 37, 1.IV.1991, 14°42'N - 92°32'W, off Puerto Madero, Chiapas, Mexico, trawling at 23 m, 5 ♂♂ CW 2.1-3.49 mm, SL

2.28-3.93 mm, 4 ♀♀ CW 1.9-2.71 mm, SL 2.2-3.22 mm (EMU-4110).

CEEMEX M2 Cruise. — Stn 17, 29.IX.1991, off Sinaloa, Mexico, trawling at 17-20 m, 1 ♀ CW 1.81 mm, SL 2.1 mm (EMU-4111). — Stn 18, 29.IX.1991, off Sinaloa, Mexico, trawling at 40-42 m, 1 ♂ CW 4.04 mm, SL 4.30 mm (EMU-4098).

CEEMEX P5 Cruise. — Stn 10, 11.XII.1991, 16°09'N - 94°58'W, off Boca de San Francisco, Oaxaca, Mexico, trawling at 23 m, 1 ♂ CW 2.59 mm, SL 2.97 mm, 1 ♀ CW 1.75 mm, SL 1.93 mm (EMU-4112).

BIOCAPESS V Cruise (CEEMEX P6). — Stn 18, 16.III.1992, 22°26'N - 105°55'W, off Teacapan, Sinaloa, Mexico, trawling at 42 m, 1 ♀ CW 2.54 mm, SL 2.98 mm (MNHN-Pg 5246).

CEEMEX P7 Cruise. — Stn 10, 9.V.1992, 16°09'N - 94°57'W, off Boca de San Francisco, Oaxaca, Mexico, trawling at 26-27 m, 1 ♂ CW 2.29 mm, SL 2.65 mm (MNHN-Pg 5247).

TYPES. — The holotype is a male specimen from off the coast of Sinaloa, Mexico (EMU-4098). The following specimens are designated the paratypes: EMU-

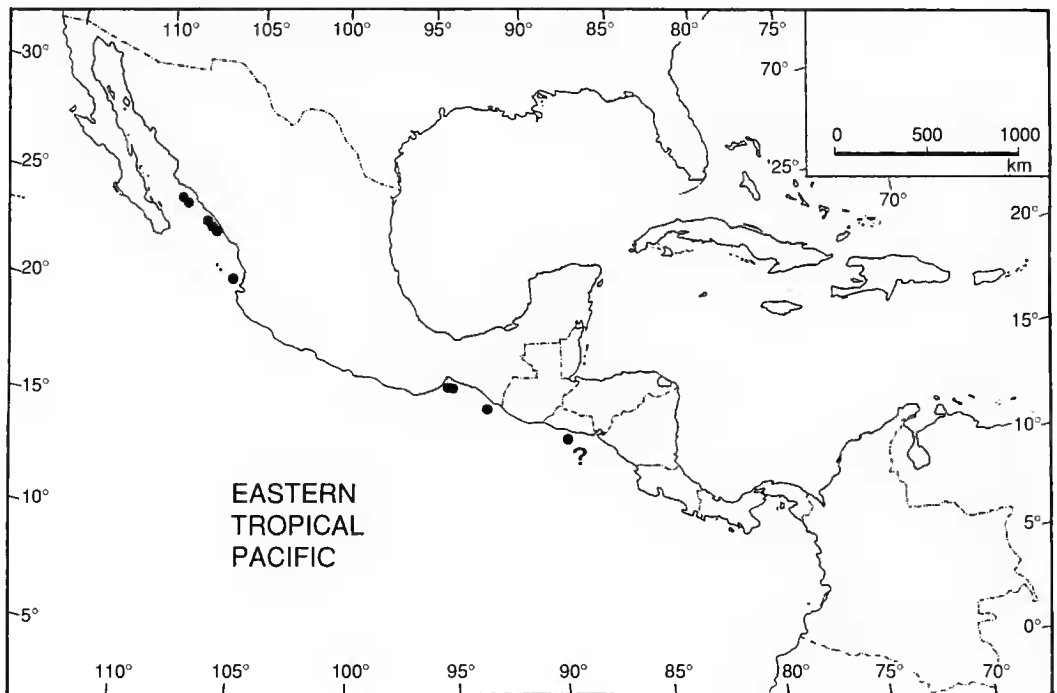


FIG. 1. — Distribution of *Clibanarius janethaigae* n.sp., in the eastern tropical Pacific. One dot might represent several sampling stations.

936, EMU-4101, EMU-4107, EMU-4109, EMU-4112, USNM-276071, MNHN-Pg 5246, MNHN-Pg 5247.

DISTRIBUTION. — From off Santa Maria Bay, Sinaloa, Gulf of California, to off Puerto Madero, Gulf of Tehuantepec, Mexico. Possibly South to El Salvador (Fig. 1), and to Colombia.

ETYMOLOGY. — The species name honors the late Janet Haig, Allan Hancock Foundation, in recognition of her work on hermit crabs and of the countless occasions she generously shared her experience and knowledge on anomuran crabs with the authors.

DIAGNOSIS

Shield slightly longer than broad, with transverse and oblique rugae. Lateral margin spiny. Antennae hairy, each segment provided with short setae and two very long setae at distal end. Antennular peduncle long, about 1.5 times as long as ocular peduncles. Chelea with the fingers slightly longer than hand; fixed finger overreaching mobile finger. Telson asymmetrical; posterior margin with eight to fourteen corneous-tipped denticles, of which three to four are stronger than the others and increase in size

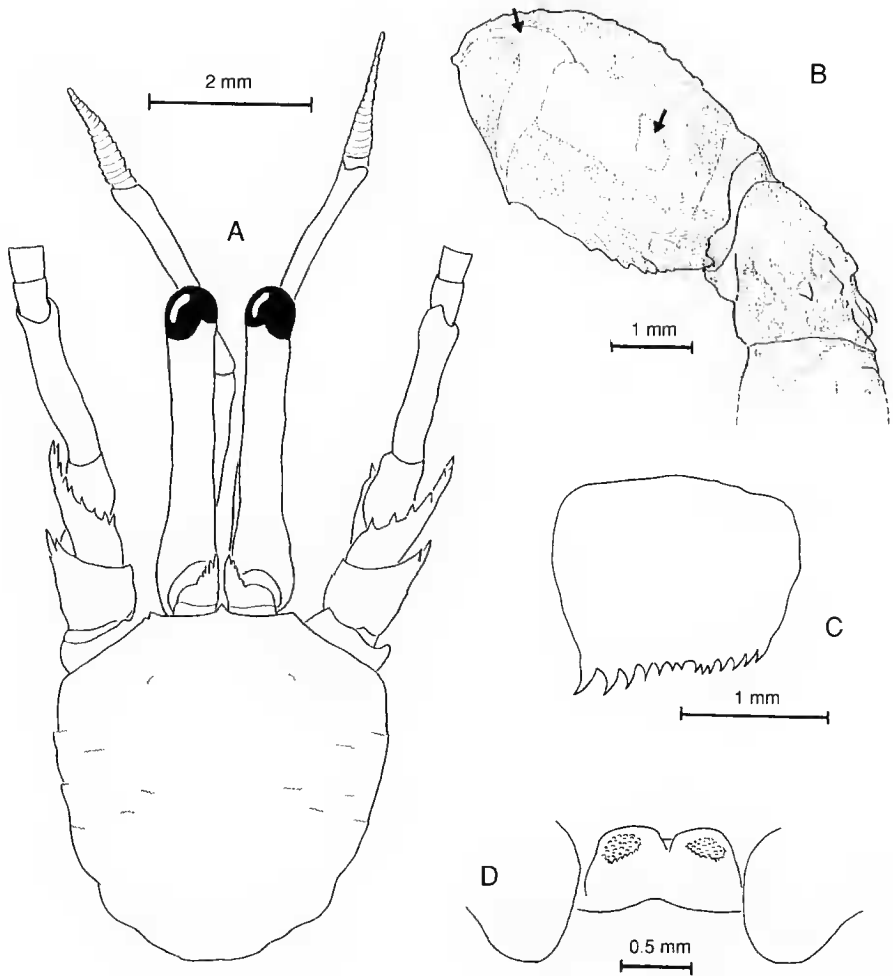


FIG. 2. — *Clibanarius janethaigae* n.sp., holotype (EMU-4098), off the coast of Sinaloa, Mexico: A, shield and cephalic appendages; B, merus and carpus of left cheliped (inner view, arrows indicate decalcified areas); C, telson (dorsal view); D, third sternite and coxae of third pereopod (ventral view).

towards the left outer angle. A dark blue ocella on the inner face of the meri of chelipeds; another dark blue smaller ocella on the outer face. Longitudinal bands of color on propodi, carpi and meri of second and third pereopods; two rings, one white and another, smaller one, reddish, at the distal end of meri; two rings, one red and another, larger one, whitish, at the distal end of propodi; three similar rings (red, white, red) at proximal end of dactyl.

DESCRIPTION

Shield suboval, slightly longer than broad, with several transverse rugae made of small tubercles and setae; lateral and anterolateral margin with small spines or spinules, sometimes wanting on anterolateral margins. Rostrum triangular, slightly longer than lateral projections, which consist of one to three denticles.

Ocular peduncles long, slender, about 5-6 times as long as broad, slightly broadened basally, shorter than shield length (peduncle length: shield length = 0.68-0.96). Cornea small, not dilated, their diameter about one-fourth to one-sixth peduncle length. Ocular acicles triangular, very close basally, multispinose (three to six marginal or submarginal spines, usually three).

Antennular peduncle long, about 1.2 to 1.7 times as long as ocular peduncle. Second and third segments not armed; basal segment with one or several small spines or tubercles on the laterodistal margin.

Antennal peduncle reaching or overreaching the base of cornea. First segment without spine. Second segment with dorsolateral distal angle produced, terminating in a cluster of up to four small spines, one mesial spine. Third segment with a strong ventrodistal projection, margin with a strong spine and a lobule. Fourth and fifth segments unarmed. Antennal acicle slightly overreaching base of fifth antennal segment, armed with eight to ten mesial teeth and occasionally with one small lateral tooth. Antennal flagella long, very hairy, slightly overreaching tip of second and third pereopods; distal end of each segment with a series of six to eight short setae, and two much longer and stronger setae.

Chelipeds subequal, the left slightly stronger. Fingers slightly longer than hand; fixed finger

slightly overreaching mobile finger. Cutting edge of fixed finger with three strong teeth, two proximal and one distal. Outer surface of hand covered with sharp, corneous-tipped tubercles; five stronger and spiny tubercles along the outer dorsal margin. Inner surface of hand almost smooth, with a few scattered spinules. Carpus provided with a strong dorso-distal marginal spine, followed by a smaller one; outer surface covered with smooth tubercles, inner surface smooth. Merus without spines or tubercles, except for a line of tubercles along the distal half of the ventromesial margin, and two spines at the distal end of the lower outer margin.

Carpi of second and third pereopod with one acute dorsal tooth at the distal end. A shallow depression running parallel to the dorsolateral border of the propodi of third pereopod, seen as a low carina in transversal view. Dactyl of second and third pereopods longer than propodi (dactyl rarely equal to propodi), ending in an acute, amber-colored, corneous claw. Propodi and dactyl of left third pereopod with a strong longitudinal carina on outer face. A ventral line of five to twelve corneous spines on dactyls, posterior to claw.

Sternal plate of third pereopod with a pair of rounded protuberances, occasionally with a row of small tubercles on the anterior margin; tuft of setae anteriorly on each protuberance.

Uropods asymmetrical, left larger than right. Telson strongly asymmetrical, with a shallow median longitudinal sulcus falling short of posterior margin. Posterior margin with eight to fourteen corneous-tipped denticles, of which three to four are stronger than the others and increase in size towards the left outer angle.

Colour

In freshly fixed specimens, there is a dark red ocella on the inner face of the meri of chelipeds and another dark red smaller ocella on the outer face. On specimens preserved for a longer period, these colored spots vanished and are indicated by area of decalcification, where muscles of the meri can be seen by transparency. A larger area of decalcification also appears proximally, on the inner face of the meri. Field notes emphasize the presence of a dark blue ocella on both the inner

and outer sides of the meri of chelipeds of living specimens. A series of six to eight longitudinal bands of color is observed on dactyl, propodi, carpi and meri of second and third pereiopods, interrupted by transversal rings of different color

at distal or proximal ends; two rings, one white and another, smaller one, reddish, at the distal end of meri; two rings, one red and another, larger one, whitish, at the distal end of propodi; three similar rings (a narrow red, a large white,

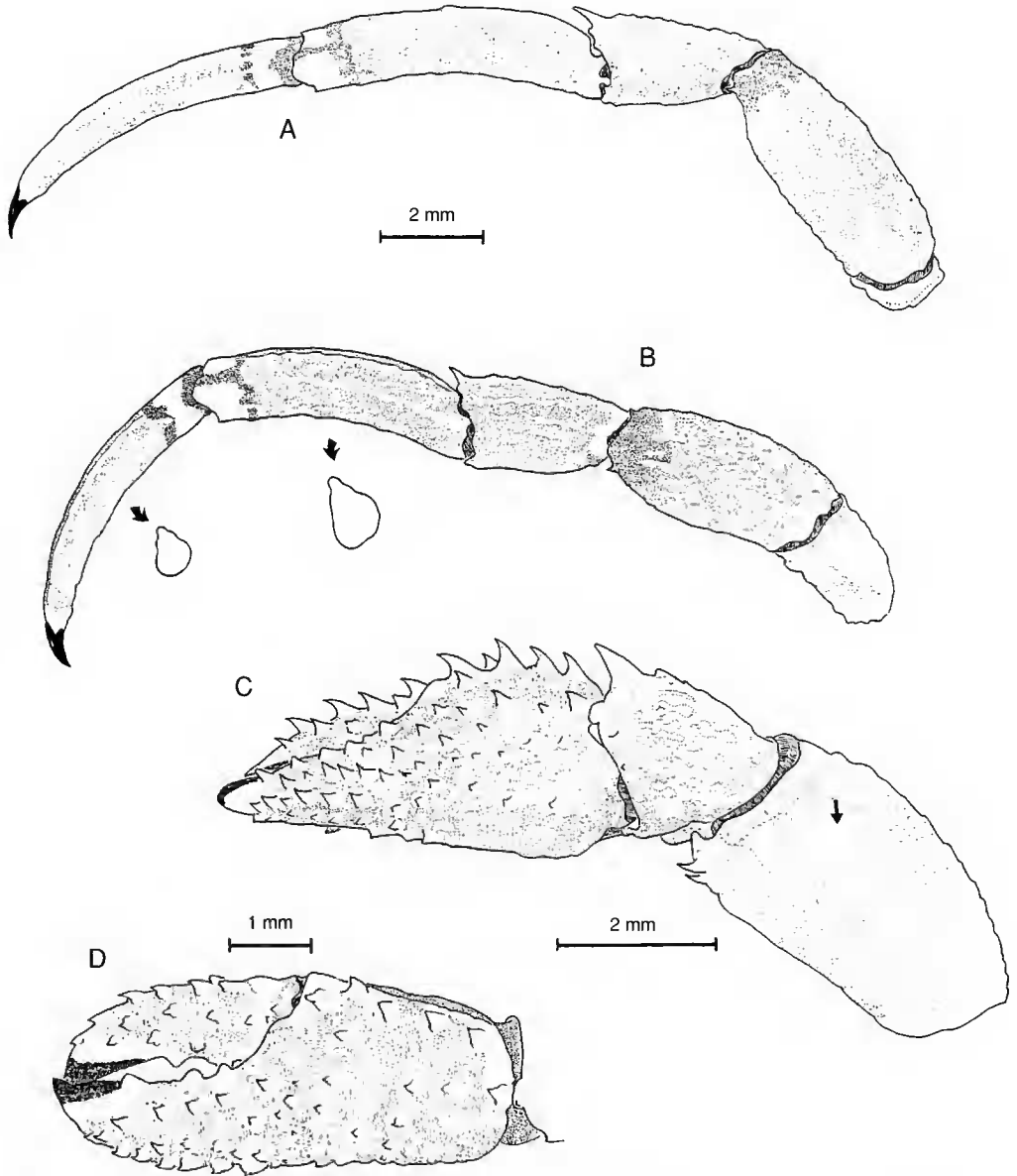


FIG. 3. — *Clibanarius janethaigae* n.sp., holotype (EMU-4098), off the coast of Sinaloa, Mexico: A, left second pereiopod (lateral view); B, left third pereiopod (lateral view), and transversal cut of propodus and dactyl; C, left cheliped (lateral view, arrow indicates decalcified area); D, chela of left cheliped (dorsal view).

TABLE 1. — Environmental data available for capture of *Clibanarius janethaigae* n.sp., in the Gulf of California, and Gulf of Tehuantepec, Mexico. Dissolved oxygen and water temperature measured at bottom level (Sa = sand; Si = silt; Cl = clay).

Cruise/Station	Depth (m)	Sediments (%)			Sand grain size	Water T °C	Oxygen ml/l
		Sa	Si	Cl			
SIPCO I/A1	35-36	48	25	27	Fine sand	16.2	0.39
SIPCO I/C1	40-41	72	18	10	Medium sand	14.2	1.70
SIPCO II/B1	32-34	37	41	22	—	27.2	3.87
SIPCO III/A2	66	00	56	32	—	13.8	<2.0
SIPCO III/C1	45	72	21	08	Fine sand	15.6	<1.0
CORTES 1/3	28-29	—	—	—	—	19.2	2.70
CORTES 2/61	48-49	94	—	—	Fine sand	16.5	1.00
CEEMEX P5/10	23	—	—	—	—	25.5	4.30
CEEMEX P7/10	26-27	—	—	—	—	25.2	3.95

and a narrow red) at proximal end of dactyl. Red rings tend to fade away ventrally.

Habitat

Clibanarius janethaigae occupies an habitat markedly different from other species of *Clibanarius* from the area. The specimens were collected from many stations, at depths of 7 to 90 m. Sediments were predominantly sandy. Water temperature at sampling stations ranged from 13.8 to 27.2 °C and dissolved oxygen from 0.39-4.30 ml O₂/l (Table 1). *Clibanarius janethaigae* is mainly associated with sponges, and several specimens of the hermit crab may be found in a single colony. The species also inhabits shells of *Knefastia*, *Turritella*, *Cancellaria*, *Polinices*, and *Solenosteira*; it was also found occasionally in empty polychaetes tubes and in the shell-like corallum formed by the hydrozoan colony *Janaria mirabilis*, an habitat also shared by *Manucomplanus varians*.

REMARKS

The reference collection of the LIB contains a large series of specimens of *C. panamensis* and *C. albidigitus* from the area. In addition, several specimens of *C. digueti* were obtained from other institutions through gift (CICIMAR, La Paz, Mexico) or loan (Allan Hancock Foundation, Los Angeles, USA). Comparative analysis of these specimens indicates that *C. janethaigae* presents a series of features that allow to distinguish it from other *Clibanarius* present in the area

(Table 2).

Number of transverse rugae on shield vary in specimens, and are occasionally totally absent. Small spines on lateral margin of shield are sometimes reduced to smooth tubercles. The presence of long, strong setae on the antenna, the relative length of the antennular peduncle, and the shape of the chela, are typical of *C. janethaigae* n.sp. Like in other species of hermit crabs, the color pattern is constant and allows to distinguish the species from the other species present in the area. Indeed, the dark ocella on both side of the merus of chelipeds are not found in any other species of *Clibanarius* described for the area. The color rings on pereopods are absent in *C. panamensis*; in this species, the longitudinal stripes are uninterrupted throughout the length of the propodi and dactyls. The two other species (*C. albidigitus* and *C. digueti*) do not feature longitudinal stripes on pereopods. The subtidal habitat is also unique among *Clibanarius* from the area.

According to a short description of material collected in 1978 in El Salvador and reported as *Clibanarius* sp. by Morán (1984: 73), *Clibanarius janethaigae* seems to range at least to off the coast of El Salvador and maybe also to Colombia (Moran *loc. cit.*).

The new species is included in the genus *Clibanarius* with some doubts. Indeed, some morphological characters are strikingly different from the other species of *Clibanarius* known from the area. The habitat is also different. All these features seem to set the present

TABLE 2. — Main differences between *Clibanarius janethaigae* n.sp. and the other three species of *Clibanarius* currently recognized for the eastern tropical Pacific.

	<i>C. janethaigae</i>	<i>C. panamensis</i>	<i>C. digueti</i>	<i>C. albidigitus</i>
1. Shield	Slightly longer than broad. Usually with numerous transverse and oblique rugae. Lateral margin with spines or tubercles.	Longer than broad. Smooth. Lateral margin unarmed.	Longer than broad. Smooth, pitted. Lateral margin unarmed.	Longer than broad. Smooth, pitted. Lateral margin unarmed.
2. Lateral projections of shield	Produced, with 1-3 small teeth.	Rounded.	Angular.	Angular.
3. Antennular peduncle	Much longer than ocular peduncle.	Reaching base of cornea.	Reaching base of cornea.	Reaching base of cornea.
4. Antennae	Each segment with both short and long, strong setae.	Each segment with very short setae.	Each segment with very short setae.	Each segment with very short setae.
5. Cheliped	Propodus slightly longer than dactyl.	Propodus and dactyl of equal length.	Propodus and dactyl of equal length.	Propodus and dactyl of equal length.
6. Third pereopod	Dorsolateral carina on propodi and dactyl.	Dorsolateral carina on propodi and dactyl.	Dorsolateral carina on propodus only.	Dorsolateral carina on propodus only.
7. Telson	Asymmetrical, posterior border with a series of 3-4 longer spines at the left angle.	Almost symmetrical, posterior border straight, with spines of similar size.	Asymmetrical, posterior border with longer spines on the left side.	Asymmetrical, posterior border with longer spines on the left side.

species somewhat apart from this genus. While revising paratype material, Dr. Jacques Forest, of the Muséum national d'Histoire naturelle, Paris, had already called our attention on the fact that the new species should probably be included in another genus, yet to be described. However, it seems reasonable to include temporarily *jane-thaigae* in the genus *Clibanarius*. The affinities of this new species will be discussed in a forthcoming paper.

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PESS V cruise, which was also partly financed by the CEE (see above). Final edition of this manuscript was done by Mercedes Cordero Ruiz.

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